

Sheet



of

(	COM TE IF KNOWN	
Application Number	09/885,232	
Confirmation Number	4989	
Filing Date	06/20/2001	
First Named Inventor	LinLin Chen	
Group Art Unit	1741	
Examiner Name	Unknown	
Attorney Docket No.	29195-8163US2	

· .	U.S. PATENT DOCUMENTS								
Examiner Initials	Cite No.	U.S. Patent or Applicati  Kind (  NUMBER (if kn	Code	Name of Patentee or Inventor of Cited Document	Date of Publication or Filing Date of Cited Document	Pages, Columns, Lines, Where Relevant Figures Appear			
UV).		09/738,551		Morrissey et al.	01/03/02				
]		09/900,710		Dordi et al.	04/18/02				
		3,267,010		Creutz et al.	08/16/66				
		3,328,273		Creutz et al.	06/27/67				
		*3,664,933		Clauss	05/23/72				
		3,770,598		Creutz et al.	11/06/73				
		*3,716,462		Jensen	02/1973	=			
		*3,878,066		Dettke et al.	04/1975	RECEIVE DEC 23			
		*3,930,963		Polichette et al.	01/06/75	DEC 23 LOJ3			
		*4,000,046		Weaver	12/28/76	MA WE			
		*4,134,802		Herr	01/16/79	L R			
		4,272,335		Combs	06/09/81	007			
		4,279,948		Kukanskis et al.	07/21/81				
		*4,576,689		Makkaev et al.	03/18/86				
		4,624,749		Black et al.	11/25/86				
		*4,959,278		Shimauchi et al.	09/25/90	,			
		4,990,224		Mahmoud	02/05/91				
		5,021,129	_	Arbach et al.	06/04/91				
		*5,115,430		Hirai et al.	05/19/92	7			
		*5,151,168		Gilton et al.	09/29/92				
		*5,209,817		Ahmed et al.	05/11/93				
		5,284,548		Carey et al.	02/08/94				
		*5,372,848		Blackwell et al.	12/13/94				
		5,409,587		Sandhu et al.	04/25/95				
7		5,443,865		Tisdale et al.	08/22/95				
MA.		*5,472,502		Lowery	12/05/95	/			

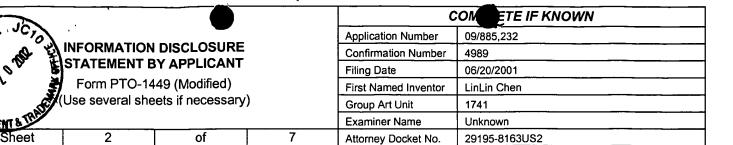
EXAMINER

DATE CONSIDERED

11/3/03

\*EXAMINER:

Initial if reference considered, whether ornot criteria is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to application(s).



	U.S. PATENT DOCUMENTS								
	U.S. Patent or Application								
Щ.	5,482,891	Shieh et al.	01/09/96						
	*5,549,808	Farooq et al.	08/27/96						
	5,576,052	Arledge et al.	11/19/96						
	*5,639,316	Cabral, Jr. et al.	06/17/97						
	5,674,787	Zhao et al.	10/07/97	4					
	5,695,810	Dubin et al.	12/09/97	RI RI					
	5,719,447	Gardner	02/17/98	TOO BEC					
	5,723,387	Chen	03/03/98	RECEVET DEC 23 20 E 1700 MAIL					
	5,730,854	Martin	03/24/98	FIG					
	5,824,599	Schacham-Diamand et al.	10/20/98	RECEIVED  DEC 23 2003  1700 MAIL ROOM					
	*5,882,498	Dubin et al.	03/16/99	3					
	5,891,513	Dubin et al.	04/06/99						
	5,897,368	Cole, Jr. et al.	04/27/99						
	*5,908,543	Matsunami et al.	06/01/99						
	5,913,147	Dubin et al.	06/15/99						
	*5,932,077	Reynolds	08/03/99						
	5,969,422	Ting et al.	10/19/99	1					
	5,972,192	Dubin et al.	10/26/99						
	*6,036,836	Peeters et al.	03/14/00						
	6,065,424	Schacham-Diamand et al.	05/23/00						
	6,069,068	Rathore et al.	05/30/00						
	*6,113,771	Landau et al.	09/05/00						
	6,197,688	Simpson	03/06/01						
	6,197,181	Chen	03/06/01						
1	6,309,524	Woodruff et al.	10/30/01						
ЦИ.	6,319,831	Tsai et al.	11/20/01						

EXAMINER		DATE CONSIDERED			
	lles 12	11/3	63		
*EXAMINER:	Initial Preference considered, whether ornot criteria is in conform	nance with MPEP 609. Draw line thr	ough citation if not in conformance and not		
	Hesper 11/3/03				

,						COM TE IF KN	OWN
	SE VC.				Application Number	09/885,232	
/\	Form PTO-1449 (Modified) (Use several sheets if necessary)		Confirmation Number	4989			
0			Filing Date	06/20/2001	,		
Ċ	2 V 3				First Named Inventor	LinLin Chen	6 7
\	O ZOME TO	(Use several sheets if necessary)			Group Art Unit	1741	1 9 7
	TOTAL TRACE	_			Examiner Name	Unknown	O C M
	Brieet	3	of	7	Attorney Docket No.	29195-8163US2	7 3 7

	U.S. PATENT DOCUMENTS								
			U.S	S. Patent or Application				00	_]
1		$\overline{\Lambda}$						3	$\Box$
	FOREIGN PATENT DOCUMENTS								ヿ゙
			Fore	eign Patent or Application			Date of		ㅓ
			1010	cigit i atent of Application	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	1	Publication or Filing Date	Pages, Columns, Lines,	
Exami		Cite	010		Code	Name of Patentee or Applicant	of Cited	Where Relevant	_
Initia		No.	Office	,	nown) 	of Cited Document	Document 40/45/04	Figures Appear	닉
114			GB	2 285 174 A		Mitsubishi Denki Kabushiki Kaisha	12/15/94		
			JP	52-16433		Furukawa Electric Co.	07/30/75		
4	•		P	5-142262		Oki Electric Co.	06/14/93		
40			WO	99/47731		Semitool, Inc.	09/23/99		
									$\geq$
						T-NON PATENT LITERATURE			
Exami Initia		Cite No.	(t			(in CAPITAL LETTERS), title of the articl symposium, catalog, etc.), date, page(s and/or country where published	), volume issue num	ber(s), publisher, city	т
Ш.	-			HASSAN O. et a 1984) pp. 118-1		Review of Electroless Gold	d Deposition I	Processes," Gold	
			and C	Copper-Aluminu	m-Ši	Electrochemical Studies of lver Alloys: Impedance Res ch 1995) pp. 000, Vol. 40, C	ults in 0.5M N	•	
			Electi	BINDRA, PERMINDER et al., "Fundamental Aspects of Electroless Copper Plating," Electroless Plating Fundamentals & Applications (January 1990) pp. 289-375, Noyes Data Corporation/Noyes Publications					
IM	),		B: Me Elect	echanisms, Kine rochemistry Vol	etics, 7: K	R., "Deposition and Dissolu Texture, and Morphology," (inetics and Mechanisms of ss, New York and London à	Comprehens Electrode Pro	ive Treatise of	

\* No month avail.

EXAMINER	DATE CONSIDERED ,
May sle	11/3/03
*EXAMINER: Initial in eference considered, whether ornot criteria is in conform	nance with MPEP 609. Draw line through citation if not in conformance and not
considered. Include copy of this form with next communication	to application(s).



## INFORMATION DISCLOSURE STATEMENT BY APPLICANT

Form PTO-1449 (Modified) (Use several sheets if necessary)

4

of

	COMETE IF KN	OWN
Application Number	09/885,232	
Confirmation Number	4989	
Filing Date	06/20/2001	6
First Named Inventor	LinLin Chen	1 R 10
Group Art Unit	1741	000
Examiner Name	Unknown	7º W Z
Attorney Docket No.	29195-8163US2	2 12 17
		R

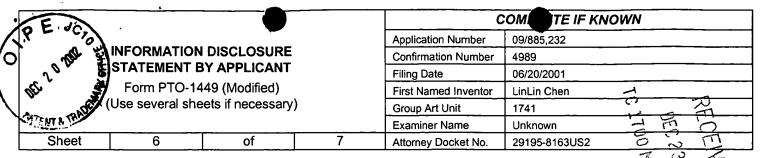
		OTHER PRIOR ART-NON PATENT LITERATURE DOCUMENTS	
Examiner Cite Initials No.		Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume issue number(s), publisher, city and/or country where published.	Т
Щ.		DESILVA, MELVIN J. et al., "A Novel Seed Layer Scheme to Protect Catalytic Surfaces for Electroless Deposition," J. Electrochem. Soc. (November 1996) pp. 3512-3516, Vol. 143, No. 11	
		DUBIN, V.M. et al., "Copper Plating Techniques For ULSI Metallization," Advanced Metallization and Interconnect Systems for ULSI Application in 1997: Materials Research Society Symposium Proceedings, (January 1998) pp. 405-411, Materials Research Society, Warrendale	
		DUBIN, V. et al., "Copper Electroplating for On-chip Metallization," 11 pgs, Advanced Micro Devices, Sunnyvale	
		DUBIN, V.M. et al., "Sub-Half Micron Electroless Cu Metallization," Materials Research Society Symposium Proceedings, (January 1996) pp. 179-184, Vol. 427, Materials Research Society	
,		DUBIN, V.M. et al., "Selective and Blanket Electroless Copper Deposition for Ultralarge Scale Integration," J. Electrochem. Soc. (March 1997) pp. 898-908, Vol. 144, No. 3, The Electrochemical Society, Inc., Pennington, NJ	
		FUJINAMI, T. et al., "Electroless Copper Plating on PZT Ceramic," Plating & Surface Finishing (May 1998) pp. 100-104	
		GABE, D.R., "Principles of Metal Surface Treatment and Protection," Second Edition (1978), Chapters 1, 2, and 8, 198 pgs, Pergamon Press, Great Britain	
		GIGNAC, L.M. et al., "Characterization of Plated Cu Thin Film Microstructures," Material Research Society Symposium Proceedings Vol. 564: Advanced Interconnects and Contacts (April 1999) pp. 373-434, Materials Research Society, Warrendale	
TM.		KANG, S. et al., "Relationship Between Texture and Surface Morphology of Copper Electrodeposits," Plating & Surface Finishing (October 1995) pp. 67-70	

	# No Months Quein!	*	No	date	<u>م</u> ين	1. 1. 1.
EXAMINER		D	OATE CO	NSIDERE	D	
	lles Ile			11	3	03
*EXAMINER:	Initial if reference considered, whether ornot criteria is in con-	forman	nce with M	<b>ИРЕР 609</b> .	Drav	v line through citation if not in conformance and not
	considered. Include copy of this form with next communicati					<del>_</del>

إز	OE JO				0	OM TE IF KN	IOWN
V' 6\					Application Number	09/885,232	1 1
J.	O THE W		N DISCLOSURE		Confirmation Number	4989	0 2
1 1. · · · · · · · · · · · · · · · · · ·					Filing Date	06/20/2001	1 M C
		Form PTO-1449 (Modified)			First Named Inventor	LinLin Chen	200
	TENT & TRACE	(Use several she	eets if necessary	)	Group Art Unit	1741	30 4
1	TEMT & TO				Examiner Name	Unknown	1 2 7
	Sheet	5	of	7	Attorney Docket No.	29195-8163US2	F 13
_						-	0

		OTHER PRIOR ART-NON PATENT LITERATURE DOCUMENTS							
Examiner Cite Initials No.		(121 ) 102 17 17 17 17 17 17 17 17 17 17 17 17 17							
UV.		KELLY, J.J. et al., "Copper Deposition in the Presence of Polyethylene Glycol: I. Quartz Crystal Microbalance Study," J. Electrochem. Soc. (October 1998) pp. 3472-3481, Vol. 145, No. 10, The Electrochemical Society, Inc.							
		KHERA, R.P., "The Basic Principles of Electrolytic Deposition," pp. 69-84							
		KRISHNAN, R.M. et al., "Electroplating of Copper from a Non-cyanide Electrolyte," Plating & Surface Finishing (July 1995) pp. 56-59, Vol. 82, No. 7							
		KRöGER, R. et al., "Properties of Copper Films Prepared by Chemical Vapor Deposition for Advanced Metallization of Microelectronic Devices," Journal of the Electrochemical Society (1999) pp. 3248-3254, Vol. 146, No. 9	۷						
		LOPATIN, S. et al., "Electroless Cu and Barrier Layers for Sub-Half Micron Multilevel Interconnects," Multilevel Interconnect Technology, Conference 3214, SPIE (October 1997) pp. 21-32, Vol. 3214							
·		LOPATIN, S. et al., "Extendibility of Ion-Metal Plasma and Electroplating Technologies for Damascene-Based Copper Metallization," 7 pgs, Advanced Micro Devices, Sunnyvale							
		LOPATIN, S. et al., "Conformal Electroless Copper Deposition For Sub – 0.5 μm Interconnect Wiring of Very High Aspect Ratio," Proceedings of the Third Symposium on Electrochemically Deposited Thin Films (1997) pp. 271-288, Vol. 96-19, The Electrochemical Society, Inc., Pennington							
		LOWENHEIM, F.A. et al. (Eds.), "Gold" Modern Electroplating, Third Edition (1974) pp. 224-244, John Wiley * Sons, Inc., New York	:						
LOWENHEIM, F.A. et al. (Eds.), "Electroless Plating," Modern Electroplating, Ti		LOWENHEIM, F.A. et al. (Eds.), "Electroless Plating," Modern Electroplating, Third Edition (1974) pp. 710-747, John Wile & Sons, Inc., New York							
46.		MURARKA, S.P. et al., "Copper Metallization for ULSI and Beyond," Critical Reviews in Solid State and Materials Sciences (1995) pp. 87-124, Vol. 20, No. 2							

	Luail * * No date a	04.1				
EXAMINER	DATE CONSIDERED	1				
lles \$347	11	3/03				
	Initial if reference considered, whether omot criteria is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to application(s).					



		To The state of th	
		OTHER PRIOR ART-NON PATENT LITERATURE DOCUMENTS	
Examiner Initials	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume issue number(s), publisher, city and/or country where published.	т
M-		MURARKA, S.P. "Metallization: Theory and Practice for VLSI and ULSI," 256 pgs (1993) Reed Publishing (USA) ♣	
		NOBE, K., "Electrodissolution Kinetics of Metals and Alloys," (date?) 17 pgs, Department of Chemical Engineering, University of California, Los Angeles	
		OSKAM, G. et al., "Electrochemical Deposition of Copper on a n-Si/TiN," Journal of The Electrochemical Society (1999) pp. 1436-1441, Vol. 146, No. 4	
		PALMANS R., et al., "Development of An Electroless Copper Deposition Bath For Via Fill Applications on Tin Seed Layers," Advanced Metallization for ULSI Applications in 1994: Materials Research Society Symposium Proceedings, (January 1995) pp. 87-94 Materials Research Society, Pittsburgh	
		REID, J.D. et al., "Impedance Behavior of a Sulfuric Acid-Cupric Sulfate/Copper Cathode Interface," J. Electrochem Society: Electrochemical Science and Technology (June 1987) pp. 1389-1394, Vol. 134, No. 6	
		SATO, N., "Toward a More Fundamental Understanding of Corrosion Processes," Corrosion (May 1989) pp. 354-367, Vol. 45, No. 5	
		SCHLESINGER, M. et al. (Eds.), "Electrodeposition of Gold," Modern Electroplating, Fourth Edition (2000) pp. 201-225, John Wiley & Sons, Inc. (USA)	
		SCHLESINGER, M. et al., "Electroless Deposition of Nickel," Modern Electroplating, Fourth Edition (2000) pp. 667-684 John Wiley & Sons, Inc. (USA)	
		SHACHAM-DIAMAND, Y., "Electroless Copper for Micropackaging and Ultralarge-Scale Integrated Circuit Applications," Materials for Electronic Packaging (1995) pp. 221-240, Butterworth-Heinemann, Newton	
110 -		SHACHAM-DIAMAND, Y. et al., "Electroless Copper Deposition for ULSI," Thin Solid Films 262 (1995) pp. 93-103	

	* No Doonthave'l.	# # No dete auxil
EXAMINER		DATE CONSIDERED
	llast & see	1 1 1
	was so the	19/3/03
*EXAMINER:	Initial if reference considered, whether ornot criteria is in c	onformance with MPEP 609. Draw line through citation if not in conformance and not
	considered. Include copy of this form with next communic	eation to application(s).

12/13/02

•	E JO	•			COM TE IF KNOWN			
Λ	WE JOY OF THE TOTAL OF THE TOTA				Application Number	09/885,232		
6					Confirmation Number	4989		
٦	J. 3	7. <del>5</del> 1			Filing Date	06/20/2001		
	Form PTO-1449 (Modified)				First Named Inventor	LinLin Chen		
V	Form PTO-1449 (Modified) (Use several sheets if necessary)			)	Group Art Unit	1741 6 72		
					Examiner Name	Unknown H. D. T.		
	Sheet	7	of	7	Attorney Docket No.	29195-8163US2 0 0 1		

		OTHER RRIOR ART NON PATENT LITERATURE DOCUMENTS				
OTHER PRIOR ART-NON PATENT LITERATURE DOCUMENTS						
Examiner Initials	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume issue number(s), publisher, city and/or country where published.				
ITN -	~~~	SHACHAM-DIAMAND, Y. et al., "0.35 µm Cu-Filled Via Holes By Blanket Deposited Electroless Copper on Sputtered Seed Layer," 3 pgs, SEMATECH, Austin				
		SMY, T. et al., "Simulation of Electroless Deposition of Cu Thin Films for Very Large Scale Integration Metallization," Journal of The Electrochemical Society (June 1997), pp. 2115-2122, Vol. 144, No. 6, The Electrochemical Society, Inc.				
		STEIGERWALD, J.M. et al., "Electrochemical Potential Measurements during the Chemical-Mechanical Polishing of Copper Thin Films," Journal of the Electrochemical Society (July 1995) pp. 2379-2385, Vol. 142, No. 7, The Electrochemical Society, Inc.				
		TAYLOR, T. et al., "Electrolyte Composition Monitoring For Copper Interconnect Applications," Presented at 193 <sup>rd</sup> Meeting of the Electrochemical Society, 26 pgs, Semitool, Inc. Kalispell				
Copper Layers: The Effect of Electron Transfer and Nucleation		WüNSCHE, M. et al., "Morphology and Stability of Electrochemically Generated Copper Layers: The Effect of Electron Transfer and Nucleation Kinetics," Circuit World (1996) pp. 4-9, Vol. 22, No. 3				
Ceramic Substrates Using ZnO Thin Film as an Intermediate La Electrochem. Soc. (May 1998) pp. 1430-1434, Vol. 145, No. 5, The Electro		YOSHIKI, H. et al., "Adhesion Mechanism of Electroless Copper Film Formed on Ceramic Substrates Using ZnO Thin Film as an Intermediate Layer," J. Electrochem. Soc. (May 1998) pp. 1430-1434, Vol. 145, No. 5, The Electrochemical Society, Inc.				
		YUNG, E.K. et al., "Fundamental Study of Acid Copper Through-Hole Electroplating Process," J. Electrochem. Soc. (March 1989) pp. 756-767, Vol. 136, No. 3, The Electrochemical Society, Inc.				
	YUNG, E.K. et al., "Plating of Copper into Through-Holes and Vias," J. Electroch So. (January 1989) pp. 206-215, Vol. 136, No. 1, The Electrochemical Society, Ir					
L'Augmentation Du Courant Limite Par Les Differentes Formes D'Elect 20 pgs ♣ ★		L'Augmentation Du Courant Limite Par Les Differentes Formes D'Electrodes, 20 pgs 🖈 🎾				

	* No Monthauell	* *	1	<b>ે</b>	Dak aveil
EXAMINER	West SIC	DATE CONS		Ī	03
*EXAMINER:	Initial <b>Y</b> reference considered, whether ornot criteria is in conformation considered. Include copy of this form with next communication			). D	raw line through citation if not in conformance and not